Description

Fixing device for producing an anchoring in panels, especially panels consisting of glass

The invention relates to a fixing device for producing an anchoring in panels, especially panels consisting of glass, having the features of the precharacterizing clause of claim 1.

The specification DE 43 34 286 C2 discloses a fixing element which is used especially for the fixing of glass panels. It consists of an anchor bolt and an expansion element, the expansion element being anchorable in a drilled hole having an undercut by being drawn into and/or pushed onto the expander cone of the anchor bolt. Between the expansion element and the wall of the undercut drilled hole there is arranged a pressing element of soft plastics material. This has the effect that the holding forces do not give rise to excessive point loads in the drilled hole, such as could not be ruled out in the case of direct contact between metal and glass.

A problem of such anchorings is that they have little flexibility. Particularly during mounting and as a result of thermally induced changes in length in the installed state, considerable transverse forces and bending moments can arise unless this is counteracted by elaborate measures, for example in the region of the supporting structure.

The problem underlying the invention is therefore to provide a fixing device, suitable especially for the fixing of glass panels, that exhibits increased resilience.

That problem is solved according to the invention by the features of claim 1. The fixing device according to the invention provides an anchoring not by means of expansion but by means of a curable composition, for example an epoxy resin, polyester resin or a mortar. The anchor bolt is surrounded in the region of its anchoring zone with a covering of a resilient plastics material. This provides the fixing element with resilience in all directions. This also has the effect that the anchor bolt

has no contact with the wall of the drilled hole at any point. Without the covering, such contact could occur, for example, as the result of the anchor bolt's being positioned off-centre or hitting the base of the drilled hole while the composition is curing. Whereas such contact can result in the mentioned point loads, a resilient covering ensures distribution over an area.

A decisive factor for the holding values achievable by the fixing, in addition to the design of the anchor bolt, is, especially, the geometry of the drilled hole. In order that a curable composition can enter into a firm bond in a drilled hole, it must result in an interlocking connection in addition to its adhesive actions. It is particularly the case with drilled holes in glass, which are typically drilled with diamond drills, that undercuts suitable for this purpose are not obtained to any extent in cylindrical drilled holes as a result of the very smooth surface. It is therefore necessary specially to introduce an undercut by rotating the drill or the like. Without departing from the inventive concept, however, such undercuts can also be in the form of irregular grooves, circumferential channels or any other kind of surface irregularity.

The resilience of the fixing device can be controlled, on the one hand, by the thickness and, on the other hand, by the modulus of elasticity of the plastics material used. The wider the covering, the greater the displacements, for example caused by thermal expansions, that can be compensated. Preferably, however, the thickness of the covering is so chosen that the smallest outer diameter of the covering is smaller than the maximum diameter of the anchoring zone of the anchor bolt. As a result, the anchor bolt cannot be pulled out of the drilled hole simply as a result of the covering's shearing off along a cylindrical surface.

Advantageously, the covering contains silicone as a constituent, because silicone has proved to be suitable as a resistant, lastingly resilient material for this application.

The invention is described in greater detail below with reference to an exemplary embodiment shown in the drawing. The Figure shows a sectional view of a fixing device 1 according to the invention for fixing a glass panel 2. The fixing element has an anchor bolt 3 with an external thread 4 as fixing means and an anchoring zone 5 having a portion 6 that widens conically in cross-section in the direction of insertion. The external thread 4 can be used for attachment to a supporting structure (not

shown), for example with the aid of nuts, washers or the like. The anchoring zone 5 has a silicone-containing covering 7 which is surrounded by a cured composition 8. The drilled hole 9 has a conical undercut 10 which prevents the cured composition 8 from being capable of being pulled out of the drilled hole 9 through detachment from the wall 11 of the drilled hole. The thickness of the covering 7 is so chosen that the portion of widened cross-section 6 of the anchoring zone 5 forms an undercut in the cured composition 8 independently of the covering. As a result, the anchor bolt 3 cannot be pulled out of the cured composition 8 even when the covering 7 has been completely displaced. Displacements in all directions of about twice the thickness of the covering and an inclination of about 10 degrees are nevertheless possible.

For anchoring by means of the fixing device 1, once the undercut drilled hole 9 has been made, the composition 8 is introduced. Before the composition has cured, the anchor bolt 3 is inserted into the drilled hole 9. The composition 8 is thereby displaced and is distributed around the anchor bolt 3. Central positioning is not necessary for this, but if such positioning is desirable for reasons of precise attachment to a supporting structure, the covering 7 can additionally have, at its end remote from the anchoring zone 5, a peripheral collar, ribs or the like (not shown) which provides for centering and/or serves as an axial stop in the drilled hole 9.